



Dr Bennett,  
from the Author.

AN



INAUGURAL DISSERTATION

UPON THE

CAUSES OF DISEASE,

SUBMITTED

PREPARATORILY TO GRADUATION

TO THE

Medical Faculty of the University of  
Edinburgh.

By ARTHUR POWELL, M. D.

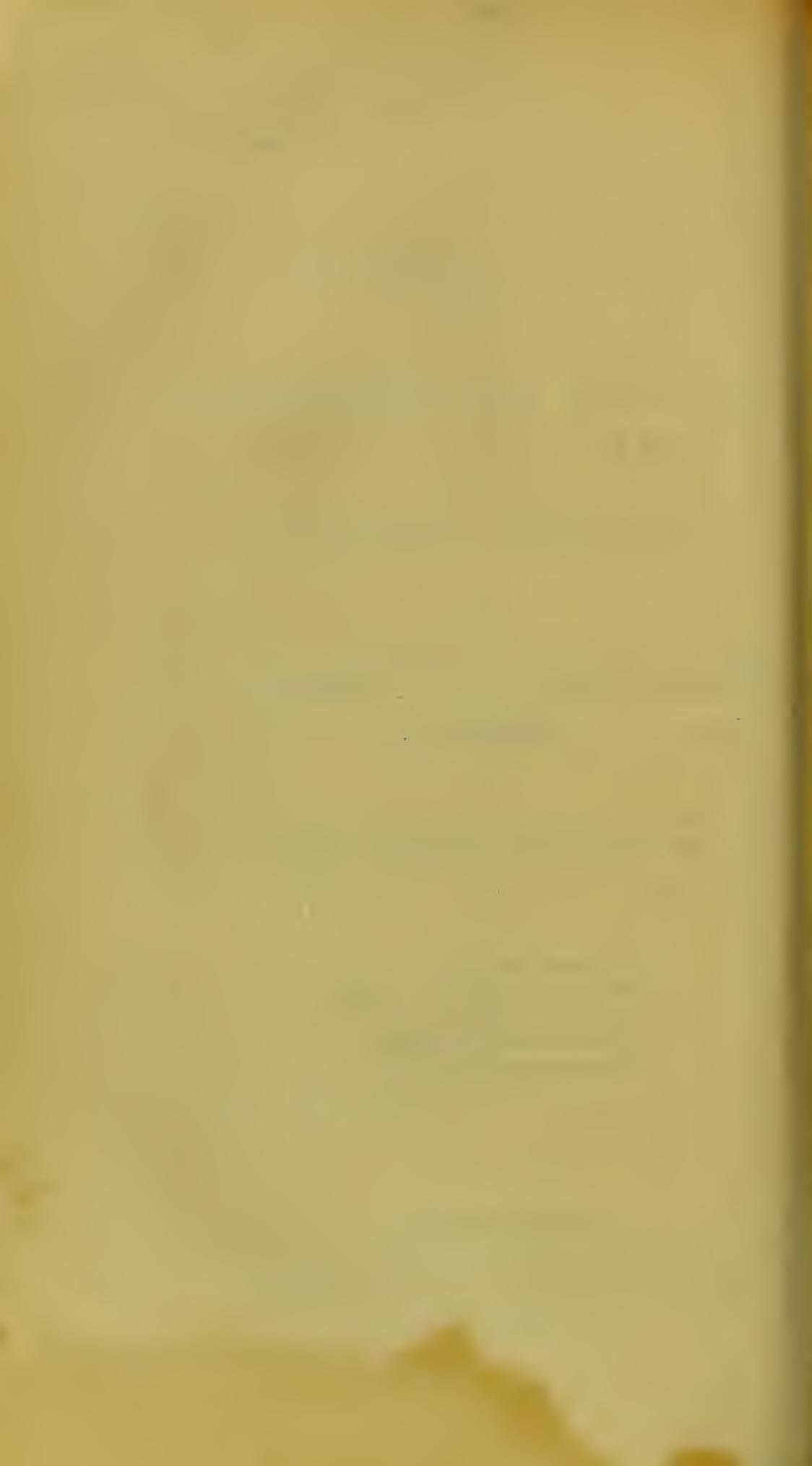
Post ignem ætherea domo  
Subductum, macies et nova febrium  
Terris incubuit cohors :  
Semotique priùs tarda necessitas  
Lethi corripuit gradum.

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ON THE

## CAUSES OF DISEASE.

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### GENERAL VIEW OF THE FUNCTIONS OF THE ANIMAL ECONOMY.

BEFORE we can hope to pursue with correctness and scientific precision, an investigation into the causes which give rise to those alterations in the vital actions, which constitute disease, it is essential that certain laws, deduced from a careful examination into the particular actions of living bodies, and from an extensive survey of those relations which unite the system by indissoluble ties into one harmonious whole, should be clearly understood. The truth of this observation is now generally admitted, and the important light which a knowledge of physiology can afford in explaining the modus operandi of external and internal agents in deranging the healthy actions, is fully appreciated.

That combination of actions which is necessary to constitute a living being, has been termed organic, and the functions which it includes are all those on which the

preservation of the individual depends. To these another class has been added, of a totally different nature, whose office it is to bestow a consciousness of existence, and of the external world ; they have been called animal, and depend on the former for their existence. In order, however, to render the connexion between the two more intimate in man and the higher orders of animals, it has been beautifully contrived, that although the essential changes in the organic actions are independent of the animal functions, the *apparatus* (as is observed in respiration, digestion, &c.) by which the conditions necessary for these changes is effected, is immediately dependent on them for the active operation of its mechanism.

The individuality of an animal exists in the sum of all its organs, that is to say, it is only by the harmonious co-operation of every part that we live, feel, and move. There are two ways by which this intimate union is preserved, and it is important that the relation and extent of each should be clearly established, for it is on derangement of one or the other that all the complications and dangers of disease depend. The first mode in which the healthy action of every organ contributes to the perfection of the whole, is by what may be termed its functional, and the second its sympathetic relations. At present we shall confine ourselves to the former; the second mode of connexion will be considered when we treat of sympathy as an exciting cause of disease.

The only method I can conceive of illustrating the functional relations, is by imagining the existence of a series of bodies which are continually revolving in a cir-

cular manner, and so related that each shall have the property of repelling the one immediately preceding, without exerting any influence on the rest. How these bodies could ever have been so arranged in that particular order which alone could adapt them to produce such a movement, it is not easy to solve, but it is very certain that if once set in motion, external circumstances only, such as displacement or modification in the peculiar property of any of the bodies, could effect a cessation or irregularity of their movements. This imaginary revolving series of bodies affords a rude but simple idea of the functional connexion which subsists between the various parts of the system. Now, if we suppose the systemic heart is one of these bodies, let us examine what will be the consequence if its action should be interrupted from any cause. In the first place, the arterial capillaries will not receive their supply of blood, and consequently are unable to secrete the peculiar fluid essential for digestion, or to renew the losses which have taken place in the several organs; hence the chyliferous vessels will be deprived of their fluids; the venous capillaries will likewise lose their usual supply from the arteries and absorbents, and the pulmonic heart being no longer replenished with blood, will cease to transmit it to the lungs, whose function is consequently at once stopt, and the whole series of beautiful dependencies between the organs suspended. Similar results would follow, if the primary source of derangement originated in any other important organ, but not so rapidly.

These considerations demonstrate how alteration, even of slight extent, in the vital actions, if continued long,

must (independently of any other mode in which they can produce derangement) give rise to extensive and general disorder. Some of the best marked examples of this are observed in organic affections of the heart and lungs, also in long continued functional disorders of the stomach and bowels.

Having premised these remarks on the organs of the body, and their mutual dependence in regard to function, we are led to inquire how organised beings originate, what are their relations with the external world, and what are the conditions necessary for the manifestation of their peculiar actions.

#### THE NATURE OF LIFE.

There is a tendency in the human mind to connect with every phenomenon the cause which produces it, and should it be impossible to find one, we call to our assistance some unknown agency endowed with sufficient power to explain every difficulty, but which merely bears the same relation to the *real cause* that an algebraical symbol does to the unknown part of a problem. The ancient philosophers attributed the properties of matter to certain spirits, and explained the various phenomena they presented by the motions and agency of these spirits; and there is no doubt that if the mind could divest itself of its *instinctive* desire for truth, this would be a far more beautiful and attractive philosophy than that of the “ambitious souls whom earth at this late period has produced,”

— who rather dive than soar, whose pains  
Have solved the elements, or analysed  
The thinking principle.

In proportion as science has extended her domains, the power and number of the spirits has been curtailed ; the idea, however, of a substantial vital principle presiding over the body is not yet entirely abandoned, although it will probably share the fate of its fellows, and be peacefully consigned with them in “the tomb of all the Capulets.”

The term life is now generally used to represent the phenomena which result from the sum of the characteristic actions of an organized being, and consequently the more numerous these are, the greater will be its manifestations. It is curious that, however unwilling persons are to adopt such an opinion, some of the most common expressions seem founded on it ; we say a man “has no life in him,” or on the other hand, is “full of life.” The evident meaning of these phrases is, that the functions of one man are inactive and imperfectly manifested, whilst another abounds in their manifestations, in fact seems to overflow with life. Life consists in excitement, or as W. Philip expresses it, is a forced state of being. The word is used in the same sense as attraction, or affinity, which do not refer to any distinct principles, but merely express the actions which take place between bodies, depending, of course, on properties inherent in them. The object of the physiologist, like that of the natural philosopher or chemist, is to study the conditions necessary for the development of these actions, the laws by which they are

regulated, and the circumstances capable of modifying them.

Every organized being requires the previous existence of another from which it is secreted in the form of a vital germ, possessed of certain properties resulting from its organism, and when placed in situations favourable for the application of such stimuli as are adapted to act upon its peculiar excitabilities, various actions are called into play, which have received the appellations of formative appetency, virus formations, &c., and serve to develope and associate the component parts of the different organs. In proportion as the development progresses, the manifestations of life produced by the active state of the various parts become more apparent, and the system having attained a certain state of evolution, seems to direct its energies rather to support the activity of the organs already existing, than to form new ones. A period at length arrives when these actions begin to decay ; experience proves what reason alone could not have solved, that organized beings have a determinate existence. This exquisitely fashioned fabric contains the seeds of its own destruction—waste is one of the essential results of action, as well in the animal body as every other machine, but the vast superiority of the former is shewn in its power of elaborating fresh materials to supply the loss of those which are carried away effete and useless, and so long as these conditions remain, or whilst the balance between absorption and deposition continues, will the phenomena of living action present themselves. Death is the “last function of life,” to die is as characteristic of organized beings as

to live, and the process by which dissolution is effected, is purely as vital as that by which the body is produced, grows, and attains its acmé. The latter is the triumph of deposition, the former of absorption. Fortunately, however, for poor humanity, the consummation of this last vital process is seldom permitted; the “thousand natural shocks that flesh is heir to,” the cares and anxieties of life, poverty, contagion, atmospheric influences, derangements arising from inordinate indulgence of the passions, and various accidental causes, make it almost impossible that any one should remain to experience “the last scene of all,” so truly and forcibly described by our immortal bard in these melancholy words, “sans teeth, sans eyes, sans taste, sans every thing.”

The preceding remarks on the development and decay of the animal body lead us to examine the nature of those vital actions in which life consists, the various causes natural or accidental which can modify them, and the boundaries which separate health and disease.

#### ON HEALTHY AND DISEASED ACTION.

VITAL action is not a simple phenomenon depending on a peculiar property resident in one organ, the conditions necessary for its production are twofold; 1st, an excitability in the organ itself; and 2d, an appropriate stimulus to act upon it. Any other term would express this property as well as excitability, it merely means a specific

susceptibility possessed by organized matter of receiving impressions from external stimuli ; we suppose it to depend on particular arrangement in the molecules which compose the tissues ; farther than this, it is useless to advance in our conjectures. According to Tiedemann, there are in the living body "as many species of excitability, and as many modes of reaction as there are tissues, each one has its own, which is called into action by its own stimuli, whatever these stimuli be, whether external, as air light, heat, food ; or internal, as blood, nervous influence, secreted humours ; each organ reacts in its own peculiar manner, a manner which supposes a peculiar organic property imparted to it in the act of its formation by the process of nutrition and sustained by the same."

Whether it is received as an ultimate fact beyond which we are unable to advance, that the excitability of every organ depends on its specific organism, or whether, adopting the opinion of some physiologists, we refer it for the sake of an hypothesis to a particular nervous tissue diffused through the body, termed ganglionic, this fact may be laid down as established, viz. that the excitability can only result from assimilation, and is consequently liable to be modified as often as the nutrition is from any cause altered. It is in this way that we explain the various natural changes and morbid predispositions which characterize organized beings. Before proceeding farther, let us ascertain what constitutes a healthy condition of the animal body. A healthy function may be defined as that degree of irritation which is produced by the operation of

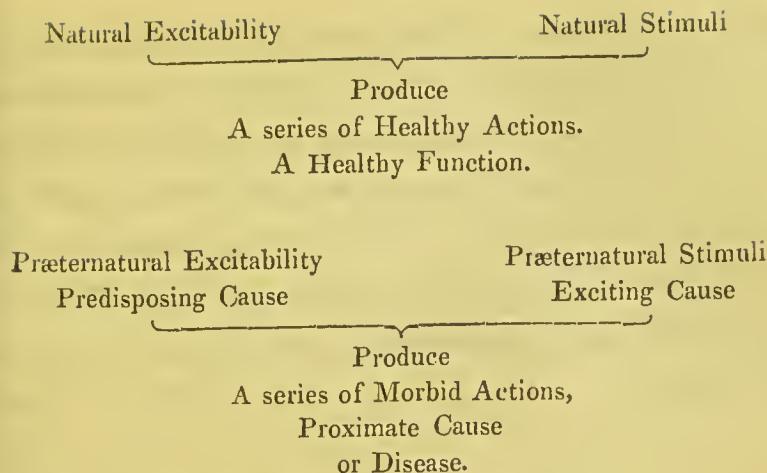
an appropriate stimulus on an organ possessing its natural excitability ; and health results from the harmonious combination of the sum of such irritations.

This is a simple definition which is applicable to every constitution, and all periods of life, because, provided the harmony is preserved, health is quite compatible with various modifications in the state of irritation, or degree of energy in the functions, and the octogenarian with his languid pulse, obtuse sensations, and imperfect nutrition, can, without any contradiction of terms, enjoy health equally as the school-boy, whose animated look, vivid sensations, buoyancy of spirit, and vigorous digestion seem to defy the effects of external agents and internal cares.

As the specific excitability of every organ is dependent on assimilation, and liable to be modified from various causes, it is manifest that such modifications must give rise on the application of the usual stimuli to reactions more or less dissimilar to what is natural, and provided these reactions lead to alterations in the structure of the part, or derange the functional and sympathetic relations, diseased action is said to be present. This state may also be produced independently of any modification of excitability by the application of a preternatural stimulus. In general, however, alterations in both the constituents of vital action are necessary for the production of disease ; for instance, how often are a number of persons exposed to the contagion of typhus or other fevers, and although all are apparently placed under the same circumstances, a few only will be attacked, the rest remaining quite well. Again, a number of persons may be ex-

posed to cold and moisture, the result of which is, that one man is affected with sore throat, another has a pleurisy, a third has diarrhoea, a fourth is attacked with rheumatism, and so on. As an illustration of the development of disease from modification of the excitability only; we shall suppose a person subjected for some time to the influence of depressing passions, fatigue, cold, &c.; these produce such a state of body as shall, even without any unnatural stimuli, give rise to typhus fever, which will be propagated to others by contagion. The effects of blisters, emetics, and other stimuli, illustrate the third mode in which diseased action is produced; these agents require no previous predisposition for their operation. Morbid action may then be defined an unhealthy irritation, produced by an unusual stimulus acting upon an altered excitability; or it may result from one only of the conditions of vital action being modified. This is the simplest and most elementary form of disease, and must invariably be regarded as the head and front of all those Protean and complicated phenomena which arise from disturbance of the functional and sympathetic relations.

The causes of disease may be divided into two great classes, the predisposing and the exciting; though it may be remarked *en passant*, that the one class is often blended with, and even fulfils the office of the other. To render the division more clear, and to present the analogy between healthy and diseased action, the following formula may be employed:



It would, perhaps, be quite as well if the term proximate cause were banished altogether ; for it means nothing more than the disease itself, which we recognise by its symptoms. It has been too much the custom to consider the symptoms as identical with the disease ; a fault originating in the exclusive study of nosological arrangements, instead of turning to nature for our knowledge. There is no doubt, that the existense of morbid action can frequently be determined only by its symptoms ; but it is equally true that they are very often absent or obscured. They bear the same relation to the disease that a shadow does to its substance ; but it is only in peculiar circumstances that the shadow is observed, and it is liable to remarkable variations in size and shape.

#### PREDISPOSING CAUSES OF DISEASE.

It will be readily understood from the preceding remarks, that every predisposing cause of disease must be resident in the body, and, in fact, depends on some *modi-*

*fication of nutrition.* This has been already insisted upon so much, that it is needless repeating what has been said. We shall therefore proceed to consider the various modes in which those changes are affected on which the predispositions depend. They may be arranged under three heads: The first includes Age and Sex; the second, Original Conformations; and the third, Acquired Conformations.

#### AGE AND SEX.

Change is the foundation of every phenomenon presented to us in nature. Life consists in action; and the term age has been used to represent the changes these actions undergo. Every organised being has its period of evolution, growth, maturity, decline, and dissolution. Each one in its time plays many parts. Man forms no exception to the general rules; and although in the pride of strength and vigour of manhood, he may boast of his superiority, and refuse a kindred with the beasts that perish, a more extended survey presents such a picture of helplessness, decrepitude, and imbecility, as can scarcely be equalled in the whole animal creation. The poet and physiologist have divided the period of human existence into various stages; the former founding his distinction on the moral and intellectual changes which it presents; the latter on the alterations of organism and change in the vital actions. However, they coincide in their results; and we may regard the admirable description given by

Shakspeare as affording the best account of the transitions which serve to chequer this “ strange eventful history.” It is only so far as the peculiarities which distinguish the different periods are interesting in elucidating the predispositions to disease that we shall consider them here. The simplest division will be into infancy, childhood, adolescence, adult age, and senescence. We must not suppose that these stages always succeed in a quiet and uniform course; the transitions are often stormy and abrupt, more or less marked in every individual, and constitute what are termed critical periods. “ *La vie*,” remarks Adelon, “ ne doit pas être comparée à un fleuve dont le cours est égal, mais à une série de noeuds d’inégale grosseur. Le passage de l’un de ces noeuds au suivant est souvent difficile, et les anciens appelaient année climatériques celles qui correspondent au moment auquel il s’accomplit. Celle doctrine des années climatériques est fondée; il est évident que lors de certaines révolutions des âges, on est plus exposé à des maladies, et à être arrêté dans le cours de sa carrière; cela est vrai non seulement de l’homme, mais encore de toutes les espèces vivantes végétales et animales.

*Infancy.*—The period included under infancy extends from birth to the seventh year; and the peculiarities which are observed in the organism and functions reside chiefly in the nervous and digestive system. The former preponderates over the other tissues, and, from its great susceptibility, is liable to be affected both directly and sympathetically from irritations existing in other

parts: hence convulsion, hydrocephalus, and epilepsy, are not unfrequent. The great activity of the digestive organs is very evident when we reflect on the rapid growth in early life. During the first year an infant effects an increase equal to twice its own weight; the whole energies of the system seem directed to this object; the sum of its occupations may be expressed by saying that it sucks and sleeps. The frequent existence of worms, and diarrhœa, and various sympathetic affections, as tabes mesenteria, apthæs, rickets, irismus, and epilepsy, indicate the irritability of the intestinal canal. Prolapsus ani and intersusception depend on the great energy of the peristaltic actions and the relaxed state of the mesentery. The functions of the skin appear also *præternaturally* active; and hence the frequency of cutaneous eruptions. Although cutting the teeth is a vital process, which ought to be affected without any constitutional disturbance, it is nevertheless attended sometimes with disagreeable consequences. The eruptive fevers are most common at this period; probably because infants are more exposed to the exciting causes. The mortality during infancy is, on an average, about half the births; and in large towns a much larger proportion die.

*Childhood.*—This extends in boys from the seventh to the fifteenth year, and in girls to the fourteenth. It is characterised by the rapid development of the body, particularly in length, increased firmness of the tissues, and gradual sinking of the central point towards the pubis. The digestive organs still continue vigorous to supply

the demands made on them. The irritability of infancy has disappeared, and the disorders which afterwards arise from internal revolutions and external agents, this bright epoch is happily free from. Tubercles are more frequent in the cervical and bronchial glands than the lungs. Intestinal irritations manifest themselves by the production of worms and chorea. The arterial system begins to preponderate over the lymphatic, and inflammations are acute and rapid in their character.

*Adolescence.*—This period extends in males to the 25th, and in females to the 21st year. We now arrive at that stage in the history of man at which it is necessary to make a distinction between the sexes; before this they can scarcely be said to differ, except in the outward signs. A new era in the existence of each commences; the important changes in the generative organs give rise to such alterations in the organism of the whole body, as serve to separate by the most striking features the healthy actions of the two sexes, and also modify in a peculiar manner their diseases. The man has now attained almost his full height; he loses the whiteness of his skin; his visage becomes more manly; hairs appear on his chin and various parts of the body; the larynx increases in size, which produces that alteration of voice which is always observed at this period; the genital organs at the same time become much developed. In the female changes equally remarkable occur, the whole contour assumes a more rounded form, from the increased deposition of fat, giving that voluptuous roundness which is so character-

istic. Hairs appear on the pubis, the ovaries enlarge, and the whole of the sexual organs, including the mammae, acquire a greater development ; the menstrual flux makes its first appearance. The peculiarities which modify the diseases at this period in the female depend on changes in the uterine system, the great development of the lymphatics, and the susceptibility of the nervous system. Consumption and hæmoptysis are frequent in both sexes. There are few diseases peculiar to men ; to the female there are many, such as chlorosis, amenorrhœa, leucorrhœa, hamatemesis, and hysteria in all its Protean forms. Insanity is also more frequent amongst the latter sex, which may perhaps be owing to education and mode of life ; there is too often a painful and continued struggle between their desire to give utterance to and indulge in the strong feelings with which they are gifted, and the necessity of conforming to the artificial rules of society. The calmness of the exterior not unfrequently conceals passions which are preying on the health, and destroying the peace and equilibrium of their sensitive minds.

*Adult age.*—This epoch extends in the male to the 60th, and in the female to the 45th year. The growth is now complete, except in diameter ; there is perfection of all the faculties ; towards its termination, however, the circulation becomes more venous and internal, the tissues are more dense, and the skin dry and harsh. In man the generative power dwindles ; woman perceives the decay of her beauty, and the anxiety which the knowledge of this occasions, together with the disturbance produced

by the cessation of the menses, prove a fruitful source of disease. The affections most common in males are asthma, angina pectoris, tetanus and piles ; those to which the female is exposed are connected with the pregnant and puerperal state. Cancer of the mammae and uterus are not uncommon at the termination of this period.

*Senescence.*—There is now a gradual decay of all the functions, although this varies greatly in rapidity ; women who have scarcely known what it is to enjoy a day's health, sometimes appear as it were to acquire a new life. There is a tendency in every organ to condensation of its tissue, and the solids increase at the expense of the fluids. Deposition of osseous matter occurs, the veins enlarge, and the circulation becomes internal. The diseases are generally connected with venous plethora, scirrhus, melanosis, and various morbid tissues are developed. Affections of the kidneys are common, and appear to arise from the greater activity required from them, in consequence of the deficient action of the skin. Gout and apoplexy are most frequent in man, probably from their more irregular life. Females are not subject to many diseases which are confined to them alone. They may perhaps claim an almost exclusive right to that strange affection, spontaneous combustion, as it has nearly always occurred in drunken old women. It has been ascertained that the mortality of females at all periods of life, notwithstanding the perils of childbirth, is less than that of men ; the

proportions of birth are in the ratio of about twenty of the former to twenty-one of the latter.

#### ORIGINAL CONFORMATIONS.

INDEPENDENTLY of the modifications which the human body undergoes from time, there are certain peculiarities impressed upon every individual during his evolution, which grow with his growth and strengthen with his strength. Children brought up under the same circumstances, exposed to the same causes, nevertheless become every day more and more different. There exists in every one of us a primitive structure, which is received from the parent, and on which is founded that variety of character which is so essential in dispelling the monotony and insipidity which would otherwise characterize human existence ; but whilst it acts so beneficially in a moral way, it is the source whence arises that complexity in the character of disease which constitutes one of the chief difficulties against which the physician has to contend. This diversity of original conformation may be considered under four heads ; 1st, External form ; 2d, Constitution ; 3d, Temperament ; and 4th, Idiosyncrasy.

*External Form.*—Experience has not proved that tall or short persons are predisposed to any peculiar diseases ; the pulse is generally quicker in the latter, and not so liable to be modified by position of the body. Rapid

growth, however, often produces such debility as predisposes to scrofulous diseases, especially phthisis. Dwarfs, and persons of small stature, may be more exposed to diseases of the nervous system, because, as the brain attains its full size before the rest of the body, any arrestment of development will cause a loss of balance in the relative proportions of the head and body. Persons of narrow contracted chests are liable to diseases of the lungs, from the greater rapidity with which the blood must flow through them, to compensate for the diminished calibre of the vessels. Hence they often suffer from consumption, hæmoptysis, &c. Apoplexy is supposed to be peculiarly common in persons with short necks and large heads; but it is certainly not correct to explain the fact, by saying that the brain being placed nearer the heart, receives a greater shock from the blood, because the experiments of Poiseuille have proved, that the real force of the blood is the same in the most distant as in the nearest vessels. The true cause appears to depend on the great facility with which obstruction of the veins of a short neck is effected by pressure. Every one must have observed the turgid appearance of the face, and the starting eyes in such persons, when attempting to turn the head towards the shoulder, whilst the swan-like neck of a tall girl will allow her head to perform almost a semi-circle without inconvenience.

*Constitution.*—A fixed standard of health is as ideal as that of beauty. It is only by comparing any derangement of the system with the natural state that we can

determine its extent. How varying in rapidity is the natural beat of the pulse in different individuals. Every one has a constitution of his own, and this is no more extraordinary than the variety of faces which we observe. What a difference is observed in the susceptibility of persons to external stimuli. Some are affected by the slightest change in the weight of the atmosphere; the state of their functions is dependent on the outward gloom or smile of nature. Others again seem to defy all impressions, however potent; clothed in a layer of enduring fat, nothing seems to rouse them. Again how varying is the activity of the nervous system. Some men appear all soul; their minds are restless, active, and, as it were, more than a match for the body. "Such men be never at heart's ease." They are predisposed to insanity, diseases of the heart, &c. Others are nice, good, easy souls, who "sleep at nights," and do not allow the placid flow of their circulation to be disturbed by any of the strange revolutions of this world. The diseases to which this torpidity of brain predisposes, are such as arise from congestion, as apoplexy, diseases of the liver, haemorrhoids, &c.

*Temperament.*—Besides the varieties which are observed in the constitution of different persons, attempts have been made to establish certain divisions of the human race, which have for their foundation a preponderance of some fluid or tissue. Particular temperaments arise from a disproportion of volume and activity in those parts which are capable of modifying in a sensible manner the

nutrition, and, consequently, the excitability of the system, without inducing a state incompatible with health. The divisions which have been proposed vary greatly in regard to the basis on which they are erected. The most ancient was founded on the preponderance of one of the four proper fluids of the body ; others again have taken for their basis the excessive development of some universal tissue. A very simple mode of classifying them is according to the relative proportion of the different regions of the body. Thus the cranial, thoracic, abdominal, or pelvic temperament indicates a preponderance of the head, thorax, abdomen, or sexual organs.

If we reject the theory on which the ancient division was founded, the names which were given them may still be adopted ; and the characters, being drawn from nature, and at a time when the distinctions were better marked than at present, are quite true. They included all the temperaments under the heads of sanguine, biliary, melancholie, and lymphatic. We shall take a short view of each, and point out the particular disease to which they predispose. *1st, Sanguine.*—The chief traits by which it is distinguished are, light flowing hair, large clear blue eyes, fresh coloured complexion, volatile and vivid mind, pulse rather quick, great development of the arterial system, hence it is most common in youth : the flesh is soft, and easily shrinks in disease, but appears as rapidly on the restoration of health. Mania and epilepsy are diseases frequent in this temperament, and the morbid tissues which occur are generally of a soft kind, such as tubercles, encephaloid matter, &c. *2d, Biliary.*—This is cha-

racterized by reddish crisp hair, small grey eyes, reddish brown cheeks ; the figure is thick and muscular, the temper violent and impetuous ; there is little development of the intellect, but when combined with the melancholic temperament, it has formed some of the greatest heroes and statesmen. The diseases are generally acute and rapid ; hæmorrhages, diseases of the heart and arteries, liver, &c. are most common. *3d, Melancholic.*—It is marked by long dark hair, dark and penetrating eyes, pale or sallow face, tall and gaunt figure, pulse slow, movements circumspect ; the mind is intense and retentive, the feelings strong ; the circulation is internal, hence it is chiefly observed in adult age. The diseases to which it predisposes are of a chronic nature, and tend to indurations and morbid growths of a carcinomatous kind. *4th, Lymphatic.*—In this temperament the hair is lank, of a light colour, eyes dim and muddy, weak but large muscles, body round, face pale and bloated ; the mind is slow and monotonous : in extreme cases it is scarcely more than a huge mass of inanimate flesh, bearing the impress of humanity. The diseases are languid, and of a cachectic form ; local congestions, dropsical effusion, and diseases of the kidney are common.

*Idiosyncrasy.*—Temperament consists in the preponderance of a *general tissue*, or one which is capable of modifying the excitability and external appearance of the body : Idiosyncrasy, on the other hand, depends on peculiarity of some *partial tissue*, which impresses an unwonted character on the excitability of the organ in which it

exists. There are no external signs by which it can be recognized, and the special organism on which it depends is only announced by its effects. All *hereditary diseases* may be referred to this head, for what do they imply except a predisposition in an organ (which is derived from the parent in whom it also exists) to undergo a peculiar morbid action on the application of certain stimuli. The chief hereditary diseases are gout, apoplexy, scrofula, insanity, hydrocephalus, asthma, ichthyosis, and lepra. The peculiar modification of nutrition, on which these diseases depend, may be engendered by other causes except hereditary transmission, as will be seen hereafter.

#### ACQUIRED CONFORMATIONS.

THE permanency of inorganic bodies depends on their insulation ; organized beings, on the contrary, require for the continuance of their existence the action of external influences on their individual organs. Their organism and vital actions are, consequently, exposed to numerous modifications, resulting from variations which must so often happen in the character of these agents. Advancement in the scale of creation being in the ratio of the extent of the relations of a living being with the external world, it follows that *man* must be the most exposed of all animals to modifications arising from this cause. It becomes then a subject of great interest to the physician as well as legislator to ascertain the influence of external circumstances on the system, and the predispositions to disease which

are developed so abundantly in this way. The inquiry is still more interesting, in so far as we have it in our power more or less to prevent, by proper precautions, the evil effects they may occasion.

Before proceeding farther, it will be necessary to make a few remarks on an important law, which serves very materially to limit the influence of external agents on the body. There is a resiliency in the constitution which enables it to resist what is injurious, and tends to produce such a modification in the excitability of the different parts, as serves to defend them more and more from the influence of external agents the oftener they are applied. "Man," says Dr. Fletcher, "is found in every clime, in every condition, from that of the most abject penury to that of the most luxurious ease, and feeding by turns on every thing which comes in his way; and what must have been the consequence, had nature not implanted in him a faculty which prevents any thing from being either very bad or very good for him, except for a time, while it renders every thing sooner or later subservient to maintaining him in equilibrio, and to keeping the Esquimaux and the Negro, the rustic and the citizen, the beggar and the king, the same 'poor bare-footed animal' which he was originally created." *Habit* is the term employed to indicate the result of this faculty. It bears the same relation to custom as effect to its cause. Custom is the frequent repetition of an act, habit is the effect of *the repetition*; or to speak more physiologically, the frequent repetition of an irritation induced by the action of a particular stimulus on any organ, impresses a new assimila-

tion and a new excitability on that organ, which serves to render the effects of the stimulus less energetic. Habit is called second nature ; in other words, it is a new organism or acquired conformation impressed on the body, whilst nature expresses the primitive organism or original conformation. The final purpose of this modification in the organism, is to defend the body against the noxious agents to which it is constantly exposed, and affords a good illustration of one of the beautiful provisions of nature for the defence of her works.

The principal external causes, which may be enumerated as capable of inducing such acquired habit of body as will determine certain predispositions to disease, are, *1st*, Climate ; *2d*, Diet ; *3d*, Mode of life, including the effects of trades and professions ; *4th*, Various debilitating causes, such as impure air, want of exercise, depressing passions, previous illness, excessive venereal indulgences, &c.

*Climate.*—The changes arising from peculiarities in the temperature and soil are so striking, as to have led some naturalists to refer all the varieties observed in the human race to this cause ; however, though reason and observation clearly establish its inadequacy to effect such metamorphoses, still changes very marked, both in the external appearance and internal organism, are observed. Almost every animal has a constitution adapted merely to the locality in which it is placed. Man, on the contrary, is restricted to no climate,—has no limited abode ; wherever sustenance can be procured will he be found capable of

retaining his existence, and perpetuating his species. It is seldom, however, that he can bear any sudden changes with impunity, and alterations in the temperature produce such modifications in his organism as strongly predispose to particular diseases. It is an interesting subject of inquiry to determine the changes which are effected during the process of *acclimation*. The temperature of the human body of every clime is about 98° Fahr., and it is found capable of retaining it when surrounded by an atmosphere as low as —50° or as high as 260°. The organs by which this uniform temperature is preserved, are the lungs and skin, the former being employed to evolve, the latter to dissipate, caloric ; hence the lungs are in greatest activity in cold, and the skin in warm climates ; but although these organs are antagonists in what may be called their secondary function, they have no relation in regard to the primary office they fulfil. It must consequently happen that the materials which they eliminate will accumulate in the system, unless some other parts receive an additional burden, and by increased activity preserve the equilibrium. The only great emunctories of the body, besides the above mentioned, are the liver,\* intestines, and kidneys ; the two

\* The analogy of function between the *lungs* and *liver* is well established by the following arguments :—1st, They both secrete carbon, the former in combination with oxygen, and the latter with hydrogen ; 2d, They are uniformly developed in an inverse ratio, *e. g.* in the *fœtus*, and during early life, the liver is unusually large, and the lungs small,—in *molluscous* animals, *reptiles*, and *fishes*, the same obtains ; on the other hand, in *insects* where the respiratory apparatus is very extensive, there

former of which appear to assist the lungs in warm climates, whilst the kidneys bear the increased burden thrown upon them by the diminished action of the skin in colder regions. These considerations enable us to understand how, (from the established law, that increased excitement in any organ predisposes it to morbid action), the lungs and kidneys chiefly suffer in cold, and the liver, skin, and alimentary canal in warm climates.

Climate must be considered not merely in regard to temperature, the degree of humidity of the air is also of importance, and materially modifies the action of the former agent; an atmosphere loaded with moisture prevents the healthy action of the skin, and consequently the redundant fluids are thrown off by the kidneys. When moisture is combined with cold, it produces general languor and diminution of energy in the vital functions, and in this way exposes the system to the effects of contagion and other exciting causes. It likewise predisposes to

is merely the rudiment of a liver; 3d, They both receive ramified venous blood, from which the secretions are derived; 4th, All causes which diminish the secretion of one increases the other. In phthisis and pneumonia, there is augmented activity of the liver. Cold, exercise, exciting passions, increase the quantity of carbonic acid, whilst the bile is diminished. Heat, idleness, intemperance, and depressing passions have the contrary effect. The Strasburg gourmands have taken advantage of these last facts, to increase the size of the liver in their geese, this organ in a state of hypertrophy, being a great delicacy in their opinion. Their purpose is accomplished by nailing the unfortunate bird by its feet to the floor, feeding it on highly stimulant food, and keeping the surrounding air very warm. An Indian nabob or Virginian planter is little more than a Strasburg goose, excepting that he does not act from compulsion.

scrofula, consumption, hemoptysis, nephritis, urinary calculi, and adynamic fevers. Edwards found that animals exhale less nitrogen when exposed to cold, and hence some have explained the production of gravel to an excess of this element in the blood; it is, however, much more reasonable to consider it as depending on a morbid state of the kidneys, resulting from their increased action. Entozoa are very common in animals which inhabit cold moist situations. The affections to which a warm moist climate predisposes are very rapid and fatal in their results; they are principally connected with the liver, skin, and alimentary canals, and require active treatment, being frequently attended with increased discharges, which speedily exhaust the patient's strength, if not checked. Putrid and remittent fevers, malignant cholera, dysentery, hæpatitis, diseases of the spleen, and severe cutaneous affections, as lepra and elephantiasis, are almost peculiar to warm climates.

Endemic diseases may in general be referred to local peculiarities in the climate, or to the food, drink, and habits of the inhabitants of certain districts. The study of these affections is very interesting, as they illustrate in a manner which is attended with little source of fallacy, the influence of external agents, such as temperature, soil, diet, &c., on the human body. As examples, we may mention the frequency of organic diseases of the liver and spleen, and various neuralgic affections which occur in marshy districts. The goitre and cretinism of Alpine districts exist principally in valleys that are encompassed by high mountains, which prevent the free circulation of

air through them, and are at the same time exposed to the direct and reflected rays of the sun. The Guinea worm of India and Africa is generally referred to the water, which is supposed to contain the ova of these worms, but it is more than probable that the water merely acts by deranging the assimilative processes.

*Diet.*—To repair the losses which continually occur in the elements composing the animal economy, an apparatus has been provided, the especial function of which is to prepare from the crude materials derived from the external world, a compound liquid substance called chyle, which affords a fresh supply of such principles as are necessary for the nourishment of the different tissues, and a reservoir from which the secreting organs may extract their peculiar fluids. Moreover, to prevent disturbance in the balance between the waste and supply, the regulation of the latter has been placed under the superintendence of an instinct, which is only called into action by the stimulus of the sensation called hunger; and this sensation, whatever may be its direct cause, is to be regarded, except in particular circumstances, as the indirect effect of such an impoverished state of the blood as is incompetent to support the functions in a state of activity. Animals in general are led instinctively to select the kind of food best adapted for their support, and obeying the guide of their feelings, seldom err in regard to quantity. Man, however, in whom all the instincts become more or less under the influence of custom and *reason*, is often tempted, for the sake of the momentary gratification of the palate,

to neglect the guide which nature has given him, and errs both in the quantity and quality of the food he takes, and likewise from necessity is too often compelled to live upon things which are innutritious, or leave the craving of hunger unsatisfied.

Before enumerating the effects of a too abundant or scanty diet, it will be necessary to examine the mode in which it can influence the system, and this leads us to the consideration of the legitimate influence which can be attributed to the blood in producing disease.

The blood is a mass of liquid flesh continually circulating through the system, at no time identically the same for more than three, or at most four minutes together, elaborated by the body, and likewise nourishing it. The organs by which it is *made*, are, the alimentary canal, the mesenteric glands, lungs, and venous system: those by which it is *unmade*, are, the arterial capillaries, secreting and excreting glands. The materials from which it must receive a renewal of the waste it undergoes, are received from the external world through the medium of the stomach and bowels. Such is a brief view of the relations of the blood to the body; and it appears incredible how any one who regards it in this simple manner, can for a moment hesitate to lay aside all exclusive theories, either of the humorist or solidist. There can be no partial explanations of the phenomena of the animal economy, no one-sided views in pathology. The body presents one grand comprehensive whole, inseparable in all its parts. "The division," says Andral, "of the solids and fluids, seems to be a distinction of small importance, and one

that is not always just, since it ceases to exist in the intimate structure of organs, where all the grand vital phenomena take place, and in which occur all the changes which constitute the morbid state." Every alteration in the action of the solids from external objects, or nervous influence, must produce a corresponding alteration in the blood, more or less extensive according to the primary modifying cause ; and also every alteration in the quantity and quality of the blood, must cause an alteration in the solids. A little calculation shows that every organ on an average receives daily a supply of blood equal to about a hundred times its own weight, which comes into intimate contact by means of the capillary vessels with every organic molecule in its tissue ;—how material, then, must its influence be, not merely in nourishing the parts, but as a stimulant necessary to develope their action.

From the preceding remarks, it appears that vitiation of the blood may proceed either directly from bad food, or indirectly from diseased state in the organs which make it ; and its morbid influence on the system is excited in effecting lesions of nutrition and secretion, or by its direct action on the intimate structure of organs. It is probably rather from modifications in its stimulating properties, than from any deficiency in its proximate elements, that it acts in producing disease.

The first effects from repeated indulgence in a diet too stimulating and nutritious, are not incompatible with health ; in fact, it is generally stated that there is an exuberance of it. The muscular system is vigorous, the mind tolerably active, except immediately after eating,

the functions are in general performed with vigour, blood is distributed largely to the skin, in short the state denominated *plethora* exists. However, this state seldom continues long, the sympathies arising from the increased energy of the functions become morbid, general excitement and all the symptoms of inflammatory fever are developed, which, after running a certain course, either relieves the general congestion by increasing the secretion of some organ, or, as more commonly happens, local congestions and inflammations ensue, often of a peculiar character, from the modifications which have been effected in the organism by the long continued effects of blood too rich and stimulating. The diseases arising from local congestions, are apoplexy, hæmorrhage, epilepsy, piles, tuberculated liver, hypertrophy of the heart, menorrhagia, and acne rosacea. The inflammations which are liable to occur are, rheumatism, gout, hepatitis, &c. Wine and animal food seem to be best adapted for developing the peculiar diathesis on which gout depends.

It is in general the custom to rail against the injurious effects arising from too much indulgence in the pleasures of the table, and to paint in most lively colours the serious consequences which ensue from it ; but when we compare them with the still more deplorable results that follow the long continued use of a poor unstimulating diet, they shrink into comparative insignificance.

Gross riot treasures up a wealthy fund  
Of plagues ; but more immedicable ills  
Attend the lean extreme.

The experiments of Magendie, and the voluntary mar-

tyrdom of Stark, have clearly shewn the dreadful effects even of food abounding in nutritious principles, but which has not a property sufficiently stimulating to excite that degree of action in the stomach which is necessary for its digestion. The effect of long deprivation of wholesome food and variety of diet, are manifested by pallor, adema, dropsical, and even hæmorrhagic effusions ; the blood becomes impoverished, and no longer possesses the property of stimulating the various organs, and preserving their healthy action. There is great susceptibility of the nervous system, and a disposition to the production of local congestions and inflammations of a chronic character, ulcerations, &c. A cachectic habit of body is established, which is marked by great languor and a peculiar dissolved unhealthy condition of the blood. The most characteristic affection arising from unwholesome food is scurvy ; other diseases often referable to the same cause, are scrofula, rickets, hæmorrhagica petechialis, amaurosis, &c. Besides the diseases to which a predisposition is given by too abundant or scanty diet, there are some which are supposed to be dependent on particular kinds of food ; a vegetable diet is said to produce diabetes ; urinary calculi and gravel arise from highly azotized food, and many endemic affections can be traced to particular articles of diet. The influence of alcoholic liquors in predisposing to disease, is very generally admitted ; but their effects are modified according to the combinations in which the spirit exists. Ardent spirits, whether taken pure or diluted with water, have a tendency to produce changes in the structure of the mucous membrane of the stomach, carci-

nomatous degenerations of the pylorus, tuberculated liver, palsy, epilepsy, &c. The gouty diathesis has been supposed to be particularly dependent on champagne. The strong wines, as port and sherry, predispose to apoplexy ; whilst ale and porter produce plethora and inflammatory diseases.

*Mode of Life.*—Man has been ordained to live by the sweat of his brow. He has been placed in the world unprovided, except while under *female domination*, with any natural food, means of defence, clothing, or resting-place. However, nature has amply compensated for this apparent neglect of her noblest work, by endowing him with an intellect, whose object and delight is to supply these deficiencies. In the rudest state of civilization, the energy of his faculties, mental and physical, are required to effect this end, and all his efforts being merely directed to the preservation of existence, any hope of improvement must be vain. To counteract the consequences which must ensue from such a state, nature has implanted in man a gregarious propensity, and he is thus enabled by a division of labour to satisfy the natural wants more easily, and his faculties being no longer confined to the mere drudgery of procuring the means of existence, seek other objects which may call them into activity, by which new wants are developed, termed social, and the multiplication of these is the best evidence of advancement in civilization ; but to satisfy the social wants, a still greater division in human labour is required, and hence the abundance of arts and employments in a population so concen-

trated and civilized as that of Great Britain. As many of these, from their very nature, and from the great labour that is necessary to make them profitable, have an injurious effect on the constitution, it forms an interesting subject of inquiry to determine their influence in predisposing to disease.

Every trade and profession necessarily supposes the cultivation of some particular mental or physical powers, which by their partial exercise, are enabled to attain that degree of perfection, which it would be idle to suppose they could arrive at if educated merely in common with the rest of the body. This partial cultivation of the faculties may be injurious, either from the mere over exertion to which one organ is subjected, or what is perhaps more common, by neglecting to give the rest of the body that degree of exercise which is necessary for its healthy functions, and for preserving that sympathy between the different parts which contributes to the perfection of the whole. There are other ways in which certain trades may be injurious, and these relate to the effects of particular poisons, or mechanical irritants, to whose influence it is necessary for persons following such avocations to expose themselves. Persons whose employments require great mental exertion, with little bodily exercise, are predisposed to diseases of the stomach and brain, such as gastrodynia, dyspepsia, melancholia, apoplexy, mania, &c. Public singers and orators, from the violent exercise of the lungs, suffer from haemoptysis, laryngitis, functional and organic affections of the heart; but the cerebral excitement under which they must so often labour

likewise tends to develope diseases of the nervous system. Continued action of the eye on small objects, such as painters, watchmakers, and engravers are obliged to exert, causes ophthalmia, amaurosis, and iritis. Shoemakers, from the pressure of the last on the lower part of the sternum, are peculiarly exposed to diseases of the stomach, liver, and bowels ; they are also liable to hypochondriasis and nervous affections, from their employment not being sufficiently active to prevent the mind dwelling on its own reflections, and brooding too much over its feelings. Phthisis is very common amongst tailors, but it probably arises as much from their dissipated habits as the trade they are employed in. The most extensive hot-bed of disease has existed of late in those huge manufactories where the spirit of competition overturns all feelings of humanity, and for the sake of gold a system of oppression is carried on, which condemns thousands to an untimely grave, or hurls them into a state of moral degradation, in comparison to which death is a blessing, and too frequently the only termination. The chief causes which are in action, and prove so injurious in the great factories, arise from a combination of imperfect ventilation, hot air, confinement, and the accumulation of animal effluvia. Children are the greatest sufferers, both from the proportionally greater exertions they undergo, and from their constitutions not being so well adapted to bear the deprivation of fresh air, exercise, and exhilarating amusements. It too often happens that imperfect nourishment is added to the other unfavourable conditions. When we consider how the assemblage of num-

bers must contribute to the deterioration of morals, and how the necessity of stimuli to support them under their exertions compels them to have recourse to ardent spirits, it is not surprising that our manufacturing towns should present such a mass of vice and disease.

Various diseases arise from the vital and mechanical action of substances to which individuals in certain trades are exposed. The workers in quicksilver mines, glass-platers, gilders of buttons, &c. suffer from the affection termed mercurial palsy. Plumbers, painters in oil and water colours, and printers, are liable to partial palsies and colica pictonum. Vegetable or mineral molecules floating in the air are injurious, and affect the respiratory apparatus. Dry grinders, needle pointers, flax-dressers, stone-cutters, coal-heavers, &c. suffer from chronic bronchitis, asthma, and consumption. The continued irritation of the lungs produces indurations and subsequent ulcerations; and among the lower orders more die from phthisis produced in this way than from the deposition of tubercles. Dr. Alison remarks, that among the stone masons of Edinburgh, there is scarcely one who lives to the age of fifty free from phthisis. Millers frequently suffer from breathing an atmosphere loaded with flour, and are generally pale, sickly, and short-lived.

Women are not so much exposed to diseases which arise from particular employments as men. There is more uniformity in their occupations, and they are not of so unhealthy a kind. Chlorotic affections and irregularity of menses are common to all who are much exposed to cold, especially wet feet, variations of temperature, &c.

Dressmakers, and such persons as are compelled to live a sedentary life, suffer from hysterical affections, deranged digestion, and amenorrhœa. The frivolous occupations, insipid society, and want of any actual duties or subjects to exercise the mind, not unfrequently lay the foundation of insanity in the higher ranks. Dissipated habits, late hours, heated rooms, and inactivity, predispose such persons to suffer from leucorrhœa, menorrhagia, and a whole host of hysterical affections ; and it is curious how the *lap-dog*, which is the sharer of the luxury and indolence of its mistress, is exposed to a similar state of morbid nervous susceptibility. The innumerable modifications which hysteria assumes are scarcely observed, except amongst those whose situation in life affords them the opportunity of indulging their feelings and vanity in frivolous occupations, and who enjoy the enviable privilege of luxuriating in indolence and ease.

*Predispositions arising from certain Debilitating Agents.*—We shall confine ourselves to a few of the most frequent of those agents which influence the organism of the body in such a way as shall predispose to numerous chronic affections, and render it very susceptible of the action of certain exciting causes, such as cold and miasma. Deficiency of pure air, and the deprivation of such a degree of muscular exercise as is necessary for the healthy action of the system, are two of the most extensive in their action. The great mortality in large towns is in a great measure owing to these causes. Children are peculiarly influenced by the loss of the stimulus of pure

air and excrcise. In London one-half of the infants born never attain the age of three years ; and the diseases from which they perish are generally such as spring from a debilitated state of body. It is in the crowded and ill ventilated alleys, which are seldom pierced by the sun's rays, that the worst forms of typhus fever develope themselves, and spread with such fearful rapidity. The scrofulous diathesis is also very prevalent in these cheerless regions. The effects of foul air are witnessed in large hospitals, and especially during a campaign, when it necessarily happens that great numbers of the sick must be crowded together, in small, ill ventilated apartments. Wounds otherwisc trifling are apt to heal slowly, and to be succeeded by erysipelas and hospital gangrene, the latter disease being scarcely ever observed, except under such circumstances.

Previous illness also predisposes to disease from the general and local debility it occasions. Scrofulous affections often follow measles, small-pox, &c., and prove more destructive than the primary disease. Organs which have suffered from inflammation are more disposed to recurrence of morbid actions, which depends partly on original conformation, but in some degree on the debilitating effects of the previous disease. Persons connected with life-insurance offices are awarc of this fact, and one of their principal questions is, whether the individual who wishes to insure his life, has had at any time previously a severe disease, and if such be the case, although he may be perfectly healthy at the time, they generally refuse his insurance ; he is considered an *unsound man*.

The effects of depressing passions are illustrated on a large scale by the much greater prevalence of sickness amongst troops during a retreat, than when they are marching against the enemy, stimulated with the hope of victory and love of glory, although the exertions they undergo in the latter case may be greater. Excessive venereal indulgence is very injurious, and predisposes to diseases of the lungs and heart, epilepsy and mania, in its worst form,—in women to leucorrhœa, menorrhagia, hysteria, prolapsus uteri, &c. The existence of any organic disease likewise acts as a predisposition to other derangements, either by producing a debilitated habit of body on account of the imperfect way in which the part in which the organic affection exists performs its particular function, or by its more immediate effect on contiguous parts,—for instance, it may produce, from increase of bulk or alteration of form, pressure on the neighbouring blood-vessels, nerves, or other organs, and, in that manner, impede or disturb their healthy action.

#### PREDISPOSITIONS TO DISEASE WHICH OCCUR DURING THE PREGNANT AND PUERPERAL STATE.

It is preferable to arrange under a separate head the diseases which occur in women during those occasional changes in the uterine system to which they are subject. The new sympathics which are called into being during the period of utero-gestation produce modifications in the organism, which are more particularly observed in the

nervous and digestive systems. It is well known, that women are much more irritable and susceptible to impressions both moral and physical ; they are easily excited or depressed by occurrences that, at other times, would pass over unheeded and unobserved. A pregnant woman is a perfect sensitive plant. They are likewise, more especially during the early months, subject to great irritability of the stomach, which is the cause of the nausea and morning sickness that often prove so distressing. From the demand made for the support and growth of the new being, and from the cessation of the menstrual discharge, the system may be considered as labouring under a state of plethora ; and this circumstance combined with the morbid susceptibility of the nervous system will explain the predisposition which exists to convulsions, apoplexy, &c.

Diseases of the most formidable and rapid character sometimes happen during the puerperal state, and the causes which appear to induce a predisposition to them, are the sudden changes which occur in the uterus and peritoneum, likewise the irritability and weakness produced by loss of blood, the protracted and violent pains of labour, and the anxieties, fears,\* &c. which have agitated the patient for some time previously,—convulsions, and even sudden death, are by no means rare immediately

\* As an example of the influence of fear and depressing passions as predisposants to puerperal diseases, we may mention an observation made by Dr. Armstrong, that for some time after the melancholy death of the Princess Charlotte, the recollection of that event occasioned a great increase in the prevalence of puerperal complaints.

after delivery. The diseases most common at this period are inflammation of the uterus and its appendages, peritonitis, and puerperal fever. Phlegmasia dolens, an affection which appears to consist in diffused cellular inflammation combined with an inflamed state of the iliac and femoral veins, is not uncommon. Puerperal mania is another melancholy affection to which a predisposition is given by the morbid state of the nervous system, brought on by the various causes enumerated above. This disease, however, may often be referred to hereditary predisposition, and is merely developed at this period by the peculiar position of the patient, and the number of exciting causes to which she is exposed.

#### EXCITING CAUSES OF DISEASE.

Having discussed the various causes which modify the organism, so as to render it proportionally susceptible to the impression of stimuli, it remains for us to treat of the causes which constitute the second condition necessary for developing diseased action. An altered state of the excitability is in general considered requisite before an exciting cause can produce the series of morbid actions in which disease consists; it would perhaps be a nearer approximation to the truth, to say that an unusual stimulus is capable in all states of the system of producing morbid action; but the particular species of disorder which is developed, depends upon a previous peculiarity in the organism

arising rather from age, sex, or conformation original or acquired ; thus cold applied in the most favourable manner will not produce rheumatism, nor will the greatest excess in diet cause an attack of gout, nor the most violent inflammation of the lungs give rise to tubercles, except in particular individuals. The division into predisposing and exciting causes is quite arbitrary. All acquired predispositions arise from the continued application of præternatural stimuli which modify the nutrition of certain parts, and it often happens that true exciting causes seem merely to act as predisponents. A number of persons, for instance, are exposed to the influence of some miasm without apparently suffering from it, probably, however, in a few days one or more of them are guilty of some indiscretion, such as a fit of intoxication, or expose themselves to cold or fatigue, and then the specific effects of the miasm are displayed, whilst the rest who have not been exposed to the secondary exciting cause continue quite well. Whether shall we consider salt meat the exciting or predisposing cause of scurvy—it may probably be arranged under both heads. The same are the relations of ergot of rye in producing gangrene of the extremities, and of lead in altering the nutrition of muscles, and exciting painter's colic.

The agents which directly develop disease may be divided into two classes ; under the first, we may arrange such as are external to the system, as caloric, light, electricity, air, aliment, miasms, viruses, poisons ; and, under the second, those which exist in the body, as retained and suppressed secretions, sympathy and passion.

Before proceeding farther, it will save repetition if we make a few remarks on that law of the animal economy which renders the ultimate effects of opposite causes similar. This law has been admitted as an ultimate fact by all physiologists ; but the credit I believe is due to Dr. Fletcher for having attempted on physiological principles to explain the rationale of the phenomenon ; the *data* on which his reasonings are founded, may be stated as follows ; first, the degree of excitability in an organ is proportionate to the quantity of ganglionic nervous matter resident in it, or (to avoid hypothesis,) to the preponderance of deposition over absorption. 2nd, Deposition is in the *direct*, absorption in the *inverse* ratio of the quantity of blood in the capillary vessels. 3d, Increased deposition is favoured by cold and all negative agents, increased absorption by heat, stimuli, &c.

The conclusion deducible from these facts, is, that excess of deposition over absorption is inversely as the degree of excitement ; hence, 1st, Increased excitement is a cause of diminished excitability ; and, 2d, Diminished excitement is the cause of increased excitability. Hence, 1st, The direct effect of stimulating agents is to diminish the excitability by favouring absorption, and diminished action consequently follows. 2d, The direct effect of cold and negative agents is to increase the excitability by favouring deposition, and is thus followed by increased action.

Hence, the *secondary* effect of a *negative* agent is similar to the primary effect of the *positive*. The former increases the excitability, the latter the stimulus.

Healthy excitement is expressed thus :—

Excitability .....	2
Stimuli.....	2
<hr/>	
Result of action.....	4

Increased excitement from negative causes may be illustrated thus :—

Excitability .....	2
Stimuli.....	1
<hr/>	
Accumulated excitability.....	1
<hr/>	
Excitability .....	2
<hr/>	
3	
Stimuli.....	2
<hr/>	
Result of action.....	5

Increased excitement from positive causes, is expressed thus :—

Excitability .....	2
Stimuli.....	3
<hr/>	
Result of action.....	5

Such is an imperfect illustration of Dr. Fletcher's ingenious explanation of this well known law of the animal economy ; a law which is of the utmost importance in elucidating the etiology of disease, and modifies in a remark-

able manner the action of remedies, rendering variety or increase in quantity necessary for the continuance of their beneficial effects.

*Caloric.*—This is one of the most universal of any stimuli to the system, it acts on every organ, and without it the action of others is useless. The range of temperature in which man can exist is rather unlimited, and it is more the *relative* than *absolute* degree which proves injurious. Caloric acts positively as an exciting cause of disease when applied in greater concentration than what the body has been previously exposed to, and negatively when applied in such a minor degree as produces the impression of cold. We shall first examine the effects of caloric as a positive agent.

The phenomena observed on the application of a temperature of about 100° Fahrenheit are increased action of the heart and arteries, distension of the capillaries, flushed face, and temporary nervous excitement—these symptoms are followed by collapse, sweating, and languor; however the conditions under which the heat is applied modify its effects materially,—it is the least oppressive in a dry atmosphere,—if the air is loaded with vapour, or if the heat be applied by means of a warm bath, the excitement is greater and more injurious, from the impediment offered to cutaneous transpiration. In a plethoric habit, apoplexy and local congestions not unfrequently supervene; when caloric acts more locally, it produces phrenitis, erysipelas, dysentery, and eruptions of the skin; in a concentrated form, burns and scalds. *Coup de soleil* is a peculiar affection occur-

ring in hot climates ; it attacks persons who have been exposed to much fatigue, are of irregular habits, and who, whilst indulging in ardent spirits, prowl about under a hot and vertical sun. The effects of the heat are not so much on the circulatory as nervous system, and death is produced by the violence of the shock. The symptoms are stupor and insensibility, convulsions, and depression of the heart's action. Death often ensues in two or three hours, and the only morbid appearances are often merely serous effusion in the brain.

The influence of cold is more various and complicated in its action, and the cause of a greater number of diseases than heat. The most usual effects of long exposure to cold are great languor, bloodless state of the surface, internal congestion, oppression, overloaded state of the heart and lungs, stupor and an irresistible desire to sleep, which, if indulged in, proves the sleep of death. If the cold be still more intense, it proves fatal by the shock on the nervous system producing such depression of the heart's action as shall cause irrecoverable syncope. The disagreeable effects of frost bite can only be referred *indirectly* to the abstraction of caloric ; it is the restoration of the circulation which causes the inflammation. The deprivation of its wonted stimulus produces such an increased susceptibility, that even the natural stimulus of the blood is sufficient to excite a degree of excitement that will terminate in gangrene : hence cold in such cases is merely a predisposing cause. Dr. Alison remarks that the effects of cold are rather in the ratio of the sensation which is excited than the absolute abstraction of the stimulus ;

and the impression is in proportion to the temperature existing previously, and in part, probably, to the degree of energy of the circulation. The diseases arising from exposure to cold are fevers ; it is particularly powerful in assisting the action of miasms. Acute laryngitis, phthisis, pneumonia, &c. in general arise from this cause ; hence the frequency of these affections in the unfortunate creatures who throng the streets of our towns : it is eloquently observed by Dr. Cheyne, that “ the hue on their cheek is not always the glow of intemperance, nor the factitious blush of modesty, but the crimson of a consuming hectic, which is rapidly hurrying them to an untimely grave.” Hæmoptysis, tetanus, ischuria renalis, bronchitis, rheumatism, and apoplexy are all more or less dependent on this agent for their exciting cause. It is generally supposed that bathing in cold water when the body is heated proves injurious ; however this seems an error, for it is a common practice in Russia to roll in snow after having exposed the body to the very high temperature of a vapour bath ; and during the harvest, every one must have observed the labourers reeking with perspiration plunge into the cold stream without suffering in the least, nay they seem to acquire fresh energy. The fatal effects observed from bathing after exercise, result from the body having become languid and fatigued when cooled by the profuse perspiration, and, consequently, reaction takes place with difficulty ; perhaps even the shock of the cold is sufficient to destroy the heart’s action when the system is in so languid a state. The same effects are observed in persons who imprudently bathe immediately after din-

ner, when the energies are all employed in digestion. It seems very doubtful whether the effects of drinking cold water when the body is heated are so fatal as is generally supposed. It is a common practice in Naples for the inhabitants, even whilst in a state of profuse perspiration, to drink glasses of iced water without any effect, except that of exceedingly refreshing them. Dr. Rush states that punch toddy or beer are equally fatal during the hot seasons, and that death results from apoplexy, to which the people are predisposed by the hot sun, fatigue, and irregular habits. It is, however, by no means surprising that the shock which cold water produces on the stomach may, in persons who are weak from fatigue and other causes, destroy life by causing syncope.

*Electricity.*—This is one of the most diffusible and subtle of the stimuli which act on the body, and at the same time the most rapid in its effects. From its efficacy in supplying the function of certain parts of the nervous system ; or perhaps, to speak more correctly, from its power of exciting actions which in the healthy state are dependent on the nerves, the vague and hasty hypothesis has been adopted that nervous influence and electricity are synonymous. Like numerous other powerful agents which the study of physics has brought to light, it has been brought forward to explain the actions observed in the living body, merely, I suppose, because nothing more reasonable can be imagined which might elucidate the mystery in which they are involved ; but all that we gain by these attempts is a term which will apparently render

the phenomena more familiar and intelligible to the grossness of our conceptions, without however serving to furnish a single idea in regard to the *true cause*. That electricity has most powerful effects on the human body there can only be one opinion; but to suppose that it acts otherwise than after the manner of other stimuli is very questionable. When applied in great intensity, for instance from a highly charged battery, or in the form of what is commonly called a thunderbolt, it sometimes provcs instantaneously fatal, by producing insensibility and depression of the heart's action. When not acting with such intensity, its influence seems chiefly exerted upon the nerves; but from its therapeutic effects, we may perhaps affirm, that there is no organ on whose excitability it does not act. Amaurosis has been frequently produced by lightning, and one of the best remedies for this disease, when dependent on palsy of the optic nerve, is electricity. Local palsies, as that of the tongue; hæmeralopia and apoplexy have all originated from this cause. Mr. Philip found, that by passing a galvanic shock through the head of a rabbit, he produced a state of nervous apoplexy, but on repeating the shock he restored it to consciousness. From the connexion which has been established between electricity and chemical action, it may be presumed, that all living bodies develope it, since all the conditions necessary for its production, such as the changes which take place in the acts of secretion, assimilation, respiration, &c., are present. We may likewise suppose that the electric condition of the different organs is liable to vary; but whether, if true, any practical advantage

could be derived from a knowledge of such a fact, is very doubtful. Disturbed equilibrium in the electric state of the air produces, in certain individuals, peculiar feelings and uneasy sensations. It is well known that persons of a susceptible constitution, and numerous animals, can foretel the approach of a thunder storm, by means of the impressions which the state of the atmosphere communicates to their body. Probably one of the reasons why persons feel so languid and oppressed from the presence of an unusual quantity of moisture in the air, arises from the increased conducting power that it acquires, on which account the body is forced to part with its electricity more rapidly than usual.

*Aliment.*—Independent of the effects of diet, in modifying the organism, and so predisposing to disease, it acts more directly and speedily by its stimulus on the stomach, and, through the medium of that organ, on the system in general. There is no organ in the body so overworked and maltreated as the stomach,—it is the slave of both the brain and senses, and is likewise the first to suffer from the effects of poverty, want, &c. We need not then be surprised that it should be subject to so many diseases, both functional and organic. There are instances of sudden death occurring from over-distension of this organ, during, or immediately after a meal. Sir E. Home relates the case of a child who died from enormous distension of the stomach, occasioned by apple-pie. Wildberg informs us of a man who died suddenly after a hearty dinner, and nothing could be found on dissection, which

could account for death, except a greatly distended state of the stomach. The other morbid effects on the alimentary canal are dyspepsia, gastrodynia, nausea, and vomiting. Diarrhoea is apt to supervene shortly after any error in diet, particularly from unripe fruit, stale beer, sour fluids or solids of any kind. Tympanitis is well known to arise from leguminous vegetables. Pharyngitis and inflammation of the gullet are often the consequence of hot liquids. Laryngitis is not uncommon amongst dram-drinkers, and may probably sometimes arise from the irritation which the spirit causes on passing over the glottis, extending downwards into the larynx. Hæmatemesis may sometimes be referred to the same exciting cause. Apthæ in the whole tract of the alimentary canal, have arisen from feeding infants on spoon meat.

The diseases proceeding indirectly from the reception of food into the stomach are numerous and important. Phrenitis often occurs from excessive intoxication; delirium tremens can hardly be referred directly to this cause; the exciting cause of this affection is generally the abstraction of the stimulus after its long-continued use. Apoplexy may originate in local congestion, produced by the stimulating effects of a meal, likewise from distension of the stomach preventing free transmission of blood from the brain. Unwholesome milk has been known to excite convulsions in infants. Acne rosacea is frequently caused by errors in diet, particularly from stimulating substances. Many persons have a disagreeable sensation of heat and flushing after the most ordinary meal. I have known instances where a draught of beer has invariably produced

th  se symptoms. Shell-fish, cheese, butter, almonds, &c. have all, in some individuals, caused nettle-rush and herpes. A fit of gout is generally excited by imprudence in diet, such as over-indulgence in animal food, condiments, &c. Acid wines are probably the most powerful in exciting a fit of gout. An overloaded state of the stomach is very apt to produce an asthmatic paroxysm in those who are predisposed to the disease.

#### MIASMS.

THE subtle invisible poisons which are included under this term have long engaged the attention of medical observers ; but as yet nothing satisfactory has been determined in regard to their real nature, nor does it appear probable that the hope of such a discovery can ever be indulged in. As is so often the case in the study of nature, we must rest contented with endeavouring to attain a knowledge of the conditions necessary for their development, and the laws which regulate their action. Miasms resolve themselves into two great divisions. The term *Malaria* may be employed to signify all *miasms* which arise from other sources than the human body, and induce specific diseases, that are not propagated in general from one individual to another. Contagion is applied to certain *animal secretions*, which produce in a person exposed to their influence diseases similar to those from which they are generated.

1. *Malaria*.—The variety of circumstances under which malaria develops itself, makes it almost impossible to determine the conditions essential to its production. As the existence of such a poison is only recognised by its effects on the body, we might imagine that the question, whether there is more than one species would be settled by observing whether more than one specific disease can be attributed to such an origin; but here again we are involved in obscurity, for on the one hand, it is not uncommon to observe the same disease under very dissimilar circumstances; and on the other, different diseases in the same district at the same time. Nay, we know farther, that the intermittent fever of our cold climate may, during a season of unusual heat, pass into the remittent of a more southern climate, and this last, again, from similar causes, into the yellow fever of the West Indies. These facts render our conclusions very unsatisfactory; but perhaps we are justified in supporting the specific nature of the poison, and may explain the multiplicity of its effects by other modifying causes. Chemical analysis affords no assistance in determining this point; it has not been able to detect the existence of any deleterious principle in the most pernicious atmosphere.

The sources of malaria vary as much as its effects. The circumstances that are considered most favourable for its development are a marshy low district, which after inundation by long rains, is exposed to a hot sun, but experience has fully proved that such conditions are not absolutely necessary. The presence of water is not always requisite, for fevers have arisen in some cases where

the ground has been in an arid state, and vegetation almost burnt up. Probably water is useful in producing such a moist state of the air as favours the accumulation of the poison, or perhaps by its depressing effects renders the body more susceptible to its action. The only condition which in all cases appears essential, is the existence of vegetable matter, but we may be sceptical in referring the malaria to its decomposition, though a few facts, such as the effects resulting from steeping flax and hemp, would seem to favour this idea. We know very well what are the products of putrefaction, and that in general they do not exist in malarious districts; besides, it is pretty well established, that putrifying animal and vegetable matter have little noxious influence on the body. The only other hypothesis which appears capable of explaining the production of malaria, is to attribute it to a *morbid vegetable* secretion. The influence of such a cause would be sufficiently extensive, and would keep up the analogy between malaria and contagion, the one being a vegetable, the other an animal secretion. Animals can separate from their fluids secretions which cannot be detected by chemical analysis, and are not perceptible to the senses; we may infer that plants have the same power. They certainly do eliminate substances, whose poisonous agency on the body is greater than either the animal or mineral kingdom can produce. It is said that the upas antiar exhales a vapour so poisonous as to be fatal to those who approach within its influence, but allowing this to be exaggerated, there is no doubt some foundation for the

story. May not the cypress and yew tree have obtained the offices which have been bestowed upon them universally, of presiding over funerals and adorning churchyards, from some depressing influence which their invisible secretions exert on the nervous system. On examining the sources of malaria, the existence of a diseased state in the vegetation may in general be considered probable. Plants in marshy districts have always a bloated unhealthy appearance after much wet. The dense and low brushwood called jungles in the East Indies, produces a disease exactly similar to what is observed in marshy countries, and it has received the name of jungle fever. The same effects are observed to arise in the neighbourhood of some of the large woods of America, under certain circumstances. It has been already stated that heat exerts a great influence in modifying the action of malaria, and we can easily understand, that it may so derange the vital actions of plants, as to aggravate their injurious effects.

The diseases which are referred to this vague principle are intermittent and remittent fevers. Perhaps the yellow fever and plague, which is endemic in the Levant, originate in malaria also. Besides the production of these specific and characteristic diseases, its agency is manifested on individuals who live in marshy districts, in various ways. They become subject in general to impaired health, imperfect digestion, diarrhoea; the complexion is sallow and sickly, and they are liable to internal congestions and organic affections of the liver and spleen,

also to various neuralgic diseases. It is also remarked that almost every disorder has a tendency to assume an intermittent type.

**2. Contagion.**—We may define contagion to be a morbid secretion eliminated from the body in a form inappreciable to chemical analysis or the senses, and which is capable of producing in those exposed to its influence a disease similar to that from which it originated. Of the existence of such a poison we have evidence which, if not strictly demonstrative, is founded on a series of observations so extensive, and divested of every source of error, as to approximate to an almost certainty. The evidence is derived from the mode of propagation of diseases supposed to originate from such a cause, and consists of such facts as the following:—1st, That although all who are exposed to its influence do not suffer, yet in a great majority of cases communication with the sick can always be traced; 2d, Those who guard against every source of exposure in general escape, and the exceptions may probably be referred to some imperfection in their precautions, whilst, on the other hand, physicians, nurses, and all whose duty it is to attend on the sick, are attacked in far greater proportion than any other class of persons; 3d, The origin of such diseases in any district can generally be traced to the introduction of contagion, either by a person affected, or from fomites, and their progress afterwards will be observed to extend gradually around from the point at which the disease first manifested itself.

In regard to the laws which regulate the propagation

and action of contagion, we may observe that all are not attacked promiscuously, a certain predisposition is requisite, and those who have been weakened by unwholesome food, bad air, cold, &c., or who are labouring under the debilitating effects of a previous debauch, excessive venery, depressing passions, particularly fear, are most easily affected. A moist close atmosphere favours its action, and a certain degree of concentration is necessary, the poison being innocuous at a few yards' distance. Dr. Henry has shewn that a temperature above  $120^{\circ}$  destroys the noxious qualities of contagion, and probably cold has a good deal of influence in retarding the rapidity of the progress of contagious diseases.

It appears extraordinary that so many physicians should have been sceptical in regard to the existence of this principle; what chiefly seems to have influenced them in forming their doubts, was an unwillingness to violate that rule in logic which inculcates the inutility of bringing forward two causes to explain any phenomenon, when one is sufficient; and as it is well established that there is scarcely a disease which does not occasionally owe its origin to other causes besides contagion, they have rather hastily jumped at the conclusion that such a principle is quite imaginary. However, so far from being swayed by such rules, I would run to the opposite extreme, and assert, that there is perhaps no disease which may not become contagious, if the secretions are vitiated. The change from a noncontagious to a highly contagious disease, is well illustrated in a case of common inflammatory fever arising from cold; in the stage of oppression and

excitement it is perfectly innocuous, but if from certain incidental causes, such as an ill-ventilated apartment, and where the nervous system has previously been much excited from spirits, mental exertion, &c., the secretions become vitiated, as is evinced by the state of the tongue mouth, and alvine evacuations, the disease is suddenly converted into a hotbed of contagion.

The diseases generally enumerated as dependent on this cause for their origin, are, 1st, All the exanthematous fevers and hooping coughs, which are, moreover, distinguished by occurring seldom more than once in a lifetime, and their contagious nature is perhaps better established than that of any other diseases ; 2d, The continued and typhus fevers of this country, the plague, probably cholera, dysentery, erysipelas, the mumps, hospital gangrene, and puerperal fever, are all occasionally referable to this cause. It is doubtful if yellow fever can with propriety be included here, for it has always been found useless to attempt to stop its progress by separating the sick from the healthy ; neither does it appear that those who attend the sick are more liable to the disease than others, and it is often impossible to trace its origin to the introduction of contagion into the district ; however, according to the principles stated above, it may become contagious in its progress.

We may here make a few remarks on a subject which has excited much angry controversy and difference of opinion among medical men—I allude to the nature of *epidemic influence*. Besides the diseases for whose pro-

duction a specific miasm is considered essential, there are some which, though often produced by, are not necessarily dependent on such a cause, which also prevail extensively at certain periods, and seem to arise from local temporary causes, the nature of which is very obscure. Erysipelas, dysentery, cholera, and influenza, are examples of such affections ; all of these exist in isolated cases at all seasons of the year, but it is only occasionally that they are observed to be what is termed epidemic ; and their great prevalence at such times may generally be referred to sudden variations of temperature, great heat, scarcity of provision, or accumulation of filth, arising from the collection and crowding of numbers together.

Perhaps the best method of explaining the vague expression, epidemic influence, will be to define it as some peculiar principle of local origin, which facilitates the diffusion within certain limits of diseases, whose exciting cause is in general either malaria, contagion, cold, or bad food. Intermittent and remittent fevers, which are endemic in marshy districts, are often observed during seasons of unusual heat to become greatly aggravated, and rage much more extensively than usual, and are gradually converted into the pestilential and fearful epidemic called yellow fever. The influence of *contagion* has perhaps been as much overrated by some, as it has been despised by others ; without some *aiding* principle it must be regarded in the light of a minor cause of disease. It is well known, that measles, scarlet fever, and small-pox, though generally existing in isolated cases at all times in

our larger towns, nevertheless are only observed to rage with any degree of violence at certain periods, and then relapse again into their former slumbering state; and this takes place so suddenly, that we cannot help suspecting the existence of some temporary cause, which, if it does not altogether supersede, at least greatly assists the specific contagion. The same phenomena are observed in the propagation of the plague. This pestilence occurs annually in Egypt, which may be considered its father-land, yet, although a free intercourse is carried on between that country and Constantinople and Aleppo during its prevalence, it is only in certain years when we must suppose some aiding cause in action that the latter cities become infected to any extent with the plague. There are many cities in Europe which were formerly frequently exposed to this pest, in which it is now quite unknown; this change must be attributed to the cessation of some cause, perhaps to internal improvement rather than a stricter enforcement of the quarantine laws. The type or peculiar character of all contagious diseases is liable to vary, not merely at different seasons when the cause is manifest, but during the same seasons in different years and under *apparently* the same circumstances; such phenomena must likewise be explained by supposing peculiar epidemic influence. "At vero," says Sydenham, "quæ qualis que sit illa aeris dispositio a quâ morbificus hic apparatus permanet, nos pariter ac compluria alia circa quæ vecors ac arrogans philosophantium turba nugatur, planè ignoramus."

## VIRUSES.

It appears simpler and more conducive to clear arrangement to classify under a separate head from contagion the morbid animal secretions which are called viruses,—not merely on account of the difference in their action on the body, or in the phenomena resulting from them, but likewise because their existence is more appreciable, and the evidence by which their properties are determined is more immediately within the range of the senses. Moreover, they are not all derived from the human body, though capable of producing diseases, which can be propagated from one individual to another when the virus has been transplanted, as it were, from the lower animals.

A virus may be defined any morbid secretion separated from the blood in a form palpable to the senses, and capable of producing when brought into contact with any of the absorbing surfaces of another individual ; or when directly introduced into the circulation, a series of morbid actions similar to those by which it was generated,—however, this is perhaps too extensive a definition, for some viruses whose origin seems to depend merely on local causes and is confined to peculiar situations, have the power only of acting on the susceptibility of corresponding situations in another person. Many of the diseases enumerated under the head of contagion can be propagated also by the specific virus which they secrete. The matter derived from the buboes, &c. of patients suffering

from the plague, has proved too truly for the subjects of this bold experiment capable of communicating a similar affection. Small-pox is well known to be propagated by the matter of the pustules, and it is from the knowledge of this fact that inoculation has been established. Hospital gangrene and erysipelas have a similar property. Amongst the diseases which can only be communicated by the actual contact of the virus, are, gonorrhœa, syphilis, vaccinia, porrigo, scabies, framboesia, and ophthalmia. It is a question of some obscurity to determine the mode in which these viruses act in producing disease. In certain cases there is no difficulty,—for instance, the poison of gonorrhœa is brought into immediate contact with the mucous membrane of the urethra, and excites a diseased action similar to the one from which it sprung, but extends no farther. The same effect is observed on the application of the pus secreted in purulent ophthalmia to the conjunctiva of another person. The pustule in cow-pox appears to depend on the same causes, but we have evidence here that a constitutional effect has been produced, which must either arise from sympathy resulting from the local irritation, or else from absorption of the vaccine matter. Porrigo seems to be a purely local affection, and though often springing from other causes than the application of a virus, such as want of cleanliness, is capable of being propagated by such means. Scabies is communicated by contact, and the virus seems to act through the cuticle, but there must be a general affection of the system from sympathy with the local impression, and it is manifested by the general cutaneous eruption.

Syphilis originates in the actual contact of the venereal poison with the glans penis and prepuce, but the host of secondary affections are sympathetic. The buboes are analogous to the inflammation of the mesenteric glands supervening on gastro-enteritis—and probably the sore throat, cutaneous eruption, &c. must be referred to the same principle, rather than to the virus still lurking in the blood. The only diseases whose existence has been satisfactorily proved to arise from a virus derived from the lower animals, are cow-pox and hydrophobia. The vaccine matter procured from a pustular affection on the mammae of the cow, though not identical with the virus of small-pox, is capable of producing such constitutional effects as renders the system almost insusceptible to that poison. Hydrophobia arises from the morbid salivary secretion of a rabid dog, and perhaps some other animals. The length of time intervening between the inoculation and constitutional symptoms, affords a good illustration of the great period which may pass by before the sympathetic effects of a local irritation develop themselves.

#### SYMPATHY.

Independently of the connexions which exist between the different organs of the body, by what is termed their functional relations, the dependence of the whole on the individual parts, and of each part on the rest, is maintained in another mode. The term sympathy has been used to express these connecting links between the organs.

Various attempts have been made to explain the nature of this principle, with what little success a slight consideration of the subject will show. It appears one of those principles which could only have been discovered by observation, and the primary cause of which must be ranked among those obscure and unfathomable mysteries which it is not within the province of human intellect to investigate ; and perhaps an equal quantum of wisdom is manifested in knowing what are the boundaries beyond which it is idle to wander, as in reaping the harvest which is so abundantly offered to those who are disposed to search within those boundaries.

When we state that by sympathy is meant the translation of the healthy irritation of any organ to another or to the system in general, which acts as a salutary stimulus on such parts, we have expressed all that is known on the subject. Although it would be highly interesting as a physiological fact to determine the mode by which such stimuli are conveyed, our inability to do so by no means renders the existence of such a principle less real.

Every organ is influenced sympathetically, and also exerts more or less influence over the rest ; but the stomach, brain, and heart, are most powerfully affected by every part, and likewise influence most strikingly the action of the whole system. They form, as it were, mirrors from which the slightest derangement existing in any organ is reflected and displayed before the observer's eye. Every one who knows the feeling of universal languor and malaise after a debauch, the muscular debility and inability to perform the easiest task, must by sad experience have

learnt the influence of sympathy. The previous excitement has left the stomach in a relaxed state, and a similar condition is produced in the whole system by the diminution of the stimulus which this organ in its healthy state imparts to every part; this want of tone in the system is not attended with absolute suffering, the distress is merely dependent on the absence of that degree of pleasure which the healthy action of every organ communicates; and in almost every case of that *hypochondriasis et tedium vitæ*, which impels its unfortunate victim to suicide, the real cause is a want of the pleasure which is derived from the healthy action of the system; and the relaxed state of the stomach by sinking every function below par, may be considered the head and front of this melancholy condition. The effects arising from the deprivation of the healthy stimulus derived from the brain, are observed in disease, or any oppression of that organ; nay, any one who enters the chamber in which a person has been sleeping, will be speedily convinced that the secretions are very much altered during that period. The heart is influenced by every trifling diseased action, and it is from the knowledge of this fact that the physician places so much confidence in the pulse.

It is only by deviations from the natural state that the extent of this connexion between the different organs is perceived. There is, however, one phenomenon presented in the healthy state which must impress us with a conviction of the impossibility of assigning any limit to the operation of Sympathy. I allude to the striking changes which take place in both sexes at puberty, from the new

irritation excited in the testicles and ovaries at that period. That they are dependent on this cause we have the positive proof that no such changes occur when by castration, or some congenital or morbid cause these alterations in the genital organs are prevented. On contemplating the number of organs continually sympathizing with each other, and the host of causes which are perpetually deranging these sympathies, we can scarcely wonder at the interminable list of maladies which are presented to the medical eye. The moment an effect is produced in any organ by a stimulus, it becomes in its turn a *cause*, and produces other *effects* which also become causes, and in this way a complication and intricacy in disease is established, which it would often baffle the skill of Ariadne herself to unravel.

It is not probable that any new sympathies are developed during disease, it is only the modifications of the natural stimulus which the irritation of every organ communicates to the rest, (more morbid in some than others, according to their specific excitability) which now becomes more obvious from the harmony being disturbed. The stimulus of the uterus contributes during its natural condition to support the tone and energy of the stomach, but it is only when a new or morbid state is developed in that organ, as occurs in pregnancy or chronic diseases, that the nausea and vomiting are perceived. Innumerable instances of a similar kind might be mentioned. There are two phenomena referable to sympathy, which are continually occurring in disease, viz. metastasis and crisis. Metastasis is the translation of the irritation of one organ to some

other ; and the organ sympathetically affected contracts a higher degree of irritation than the one primarily diseased and obscures its existence ; it generally takes place from internal to external organs ; if the contrary happens, the disease is usually aggravated, as when rheumatism affects the heart, or gout the stomach or brain. When the primary irritation is translated to an organ of secretion or exhalation, and produces a powerful sympathetic irritation there, a crisis, or critical discharge occurs, and the disease generally terminates favourably. This phenomenon is observed in fevers and various other affections.

Medicine owes much to M. Broussais for the light which he has thrown on the morbid sympathies, and their extensive influence in disease ; but he allowed the enthusiasm of a discoverer to bias the calmer judgment of the philosopher when he attributed every disease to a primary gastro-intestinal irritation. It is however very certain, that a great many affections occasionally depend on such a cause. What the ancients attributed to crude matter absorbed from the stomach, entering the circulation and exciting inflammations and functional derangement in various parts, the modern *theorists* attribute to a primary irritation in the stomach and bowels, conveyed by sympathy to other organs. Of the diseases more or less dependent on gastro-enteritis, (which term includes any morbid state of the mucous membrane of the alimentary canal, from the slightest hyperamia to acute-inflammation) we may enumerate functional and organic affections of the liver so common in persons whose stomachs are continu-

ally excited by ardent spirits, condiments, and over distension ; the host of symptoms arising from dyspepsia, which simulate apoplexy, diseases of the heart, phthisis, &c., are well known. Chlorosis depends on primary derangement of the intestinal canal, causing amenorrhœa, and general disorder of the health. Perhaps there is scarcely a disorder of the nervous system which may not be developed in consequence of long-continued gastro-enteritis. Insanity, epilepsy, hysteria, chorea, tetanus, hypochondriasis, &c., all crowd under this head. Gout is generally preceded by derangement of the digestive organs, and so are almost all cutaneous affections. In infants gastro-enteritis produces hydrocephalus ; in boys, epilepsy ; in girls, chorea ; in women, from puberty to middle age, hysteria ; in men, tetanus ; in old people, apoplexy.

Symptomatic fever consists in the sum of the sympathetic effects resulting from any irritation, and consequently the more severe the local affection is, and the more extensive the connexions of the part primarily affected, the better marked will the fever be. Various other diseases are referable to sympathy. Diarrhœa arises from dentition—asthma from disordered bowels. The effects of suppressed secretions may generally be explained by this principle. Hysteria, convulsions, epilepsy, neuralgia, and spinal irritation are all developed by functional derangement of the uterus. Pain of the right shoulder is the sympathetic effect of diseased liver. Pain of testicle and inside of the thigh is caused by inflammation of the kidney. Stone in the bladder causes irritation of the glands and penis. Various neuralgic pains depend

on dyspepsia. It is generally observed that if an organ is diseased, its fellow frequently sympathises with it. Injury of one eye is often followed by inflammation of the other. We may conclude the subject of sympathy by observing, that affections which appear most complex in the number and dissimilarity of symptoms, seldom consist of more than one or two primitive or essential elements.

#### PASSION.

The world is growing too wise to take much interest in the scholastic disquisitions which have been carried on from time immemorial with such acrimony, in regard to the distinctions between mind and matter. What we have to consider here is the extensive influence which the mind (whether regarded as a function of the brain, or a distinct substance) exerts upon every part of the body. It is in the ratio of the progress of refinement that the effects of passion and feeling are seen in greatest activity. Civilization has the effect of producing a preponderance of the nervous over the other tissues ; this is very evident from a comparison between the moral and physical character of a man of the higher classes, and the hardy athletic peasant. Ambition, struggles for power, wealth, and fame, extensive speculations, cares and rankling jealousies, are almost incompatible with a mind that has not been roused into unnatural activity. The feelings arising from over excitement of the imagination, romantic and visionary views of love and religion, are chiefly observed

in such minds. Women, who have naturally excess of the nervous tissue, a fact which explains the remark of Byron, that "all passions in excess are female," are exposed in civilized society to numerous causes which excite to still greater activity their feelings and passions. Their inactive life, both intellectual and corporeal, the frequent excitement of the dance, theatre, poetry, works of imagination, &c., too much indulgence in their fancies, and the life of celibacy which the state of society renders necessary, all combined, make it by no means extraordinary that we should so frequently see creatures whose bodies are the mere sport and plaything of an overwrought and morbidly excited nervous system.

Passion may be defined a primary irritation of the brain, exciting certain peculiar actions in one or more organs; hence its action is very analogous to sympathy. There are various phenomena which result from the operation of this cerebral influence that are quite compatible with health, such as increase of various secretions, of the tears from grief or joy; of the kidneys, intestines and skin from fear; of the saliva, from the recollection of a *bon morceau*, and many others which need not be mentioned. One of the most prevalent class of diseases produced by mental emotions are the various species of insanity; this affection is very rare among barbarous nations, and seems to be one of the constant attendants in the train of civilization. Attacks of mania often follow domestic calamities and reverses of fortune; disappointment in love, too great indulgence in any train of feelings, particularly if relating to religious subjects, is apt to cause monomania.

Terror frequently gives rise to complete idiotism. That species of insanity to which the term moral has been applied, and which is marked by a perversion of the feelings, whilst the intellect remains quite sound, is often observed during great political changes. Men seem to be suddenly emancipated from the control of all social and moral laws. It is only by referring it to moral insanity that we can explain such a perversion of every human feeling as is seen in a Robespierre, Danton, &c., or as is often observed in the wanton and useless cruelties committed by an army flushed with victory.

Instances are frequently occurring of fatal effects resulting from violent passions, which act by inducing apoplexy, or in some cases rupture of an aneurism. Arachnitis is sometimes the consequence of anger and anxiety of mind. The effects of depressing passions are too often presented in most painful and distressing forms. Intense grief has sometimes proved immediately fatal; hope deferred, disappointment in love, the blighted views of the young enthusiast, manifest their effects on the system in the form of consumption, chlorosis, dyspepsia, amaurosis, and scurvy. Enlargement, and other organic affections of the heart, also result from depressing exertions; and so far that melancholy expression, "he died of a broken heart," is not altogether unfounded in pathology. Jealousy is often the exciting cause of biliary calculi, jaundice, &c., hence the expressions, "I will inflict him with yellowness," "Green-eyed monster," &c., alluding to the effects of this passion. Hæmoptysis and menorrhagia often arise from sudden grief, or violent passion. Suppression

of the menses is frequently produced by fear, any startling or sudden emotion ; and the attack of hysteria, phrenitis, or even mania, which sometimes follows, is referred to the primary causes, though probably it depends on the reflex action of the uterus on the brain. There is a peculiar kind of sore throat, not uncommon in females, called nervous, which is excited by mental emotions, and disappears again very rapidly. Imitation may be mentioned as a cause of some diseases ; it is well known that the occurrence of a convulsive disease amongst a number of individuals is frequently followed by a similar affection in one or more of the lookers-on. It is often observed in the female wards of an hospital, that the seizure of one of the patients with hysteria is followed by a similar attack successively in all who happen to be hysterically disposed. There is frequently no feigning in the case, but it is difficult to explain the cause of the phenomenon, unless by referring it to that moral sympathy which is the connecting link between man and man.

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